aastex emulateapj5,natbib

aa

^{h} min ^{m} sec ^{s} deg $^\circ$

N5 λ1240 Si4 λ1394 and λ1403 Si4 λ1394 Si4 λ1403 C4 λ1549 He2 λ1640 C3] λ1909 [Ne4] λ2424 Mg2 λ2800 [N2] λ6548 [N2] λ6583 [S2] λ6716 [S2] λ6731 [O3] λ4959 [O3] λ5007

Lyα N5 Si4 C4 He2 C3] [Ne4] Mg2 [N2] Hα [S2] Hβ [O3]

$W_{\lambda,rest}$ Hα(n) Hα(b) $-.2ex¿\sim$ $-.2ex¡\sim$ σ_{sky}

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Dawson et al. A High–Redshift, Hard X–ray Emitting Spiral

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Optical and Near–Infrared Spectroscopy of a High–Redshift, Hard X–ray Emitting Spiral Galaxy1

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abstract We present optical and near–infrared Keck spectroscopy of CXOHDFN J123635.6+621424 (hereafter HDFX28), a hard X–ray source at a redshift of $z = 2.011$ in the flanking fields of the Hubble Deep Field–North (HDF–N). HDFX28 is a red source ($\mathcal{R} - K_s = 4.74$) with extended steep–spectrum ($\alpha_{1.4GHz}^{8.4GHz} > 0.87$) microjansky radio emission and significant emission (441 μJy) at 15 μm. Accordingly, initial investigations prompted the interpretation that HDFX28 is powered by star formation. Subsequent *Chandra* imaging, however, revealed hard ($\Gamma = 0.30$) X–ray emission indicative of absorbed AGN activity, implying that HDFX28 is an obscured, Type II AGN. The optical and near–infrared spectra presented herein corroborate this result; the near–infrared emission lines cannot be powered by star formation alone, and the optical emission lines indicate a buried AGN. HDFX28 is identified with a face–on, moderately late–type spiral galaxy. Multi–wavelength morphological studies of the HDF–N have heretofore revealed no galaxies with any kind of recognizable spiral structure beyond $z > 2$. We present a quantitative analysis of the morphology of HDFX28, and we find the measures of central concentration and asymmetry to be indeed consistent with those expected for a rare high–redshift spiral galaxy.